

THE
**RESILIENT
SOCIETY**

MARKUS K. BRUNNERMEIER

Book Available
- in English: End of August

IEPECDG.com

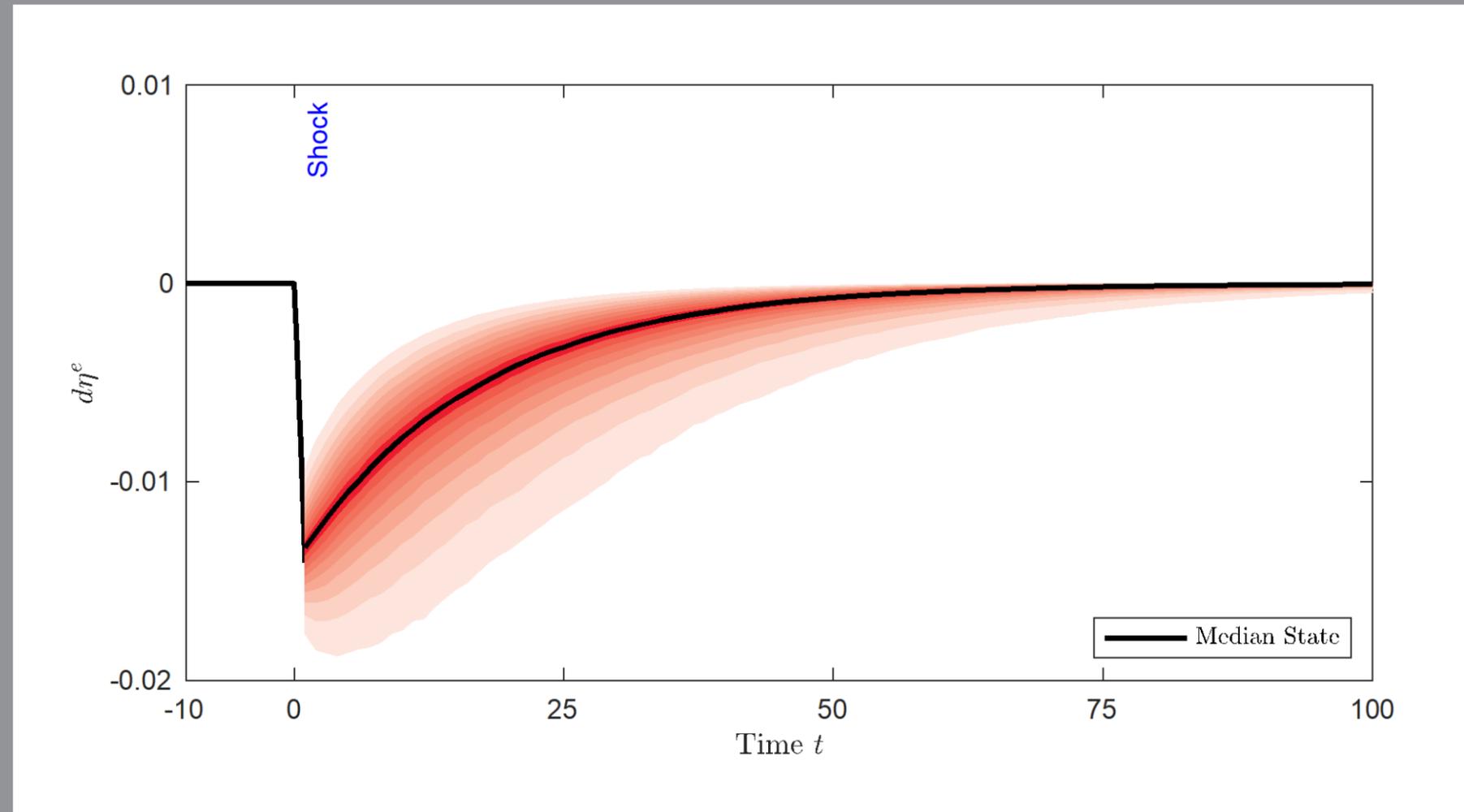
Brazil, 26. July 2021

Resilience

- **Resilience** management - squeezed between rubber wall
 - Mean-reversion bounce back



roly-poly toy



Resilience \neq Risk

- **Resilience** management - squeezed between **rubber wall**

- Mean-reversion bounce back



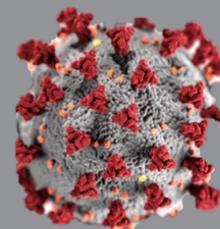
roly-poly toy

- **Risk** management

- Variance



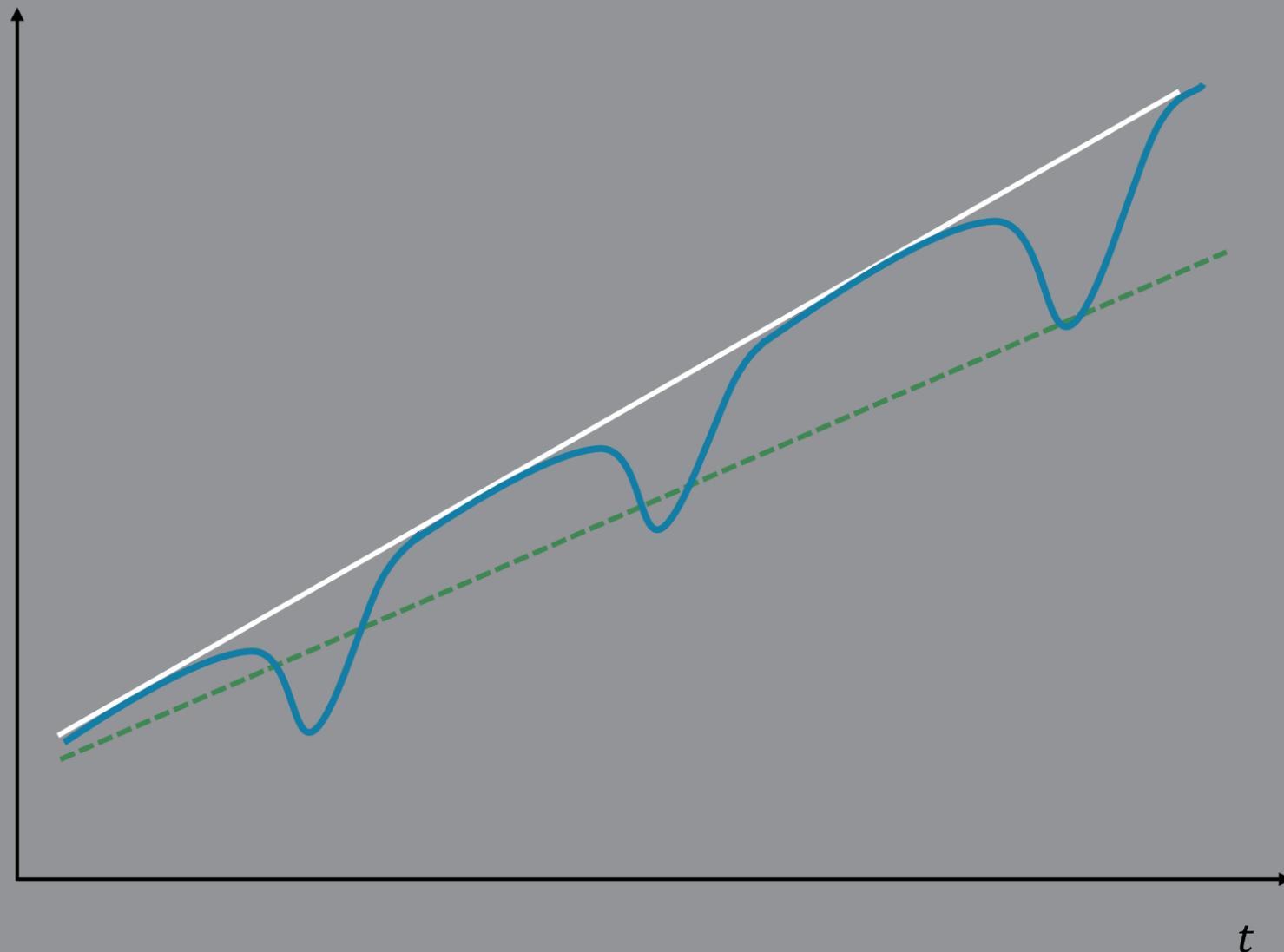
- squeezed between **concrete wall**



- *Tail Risk Analysis*

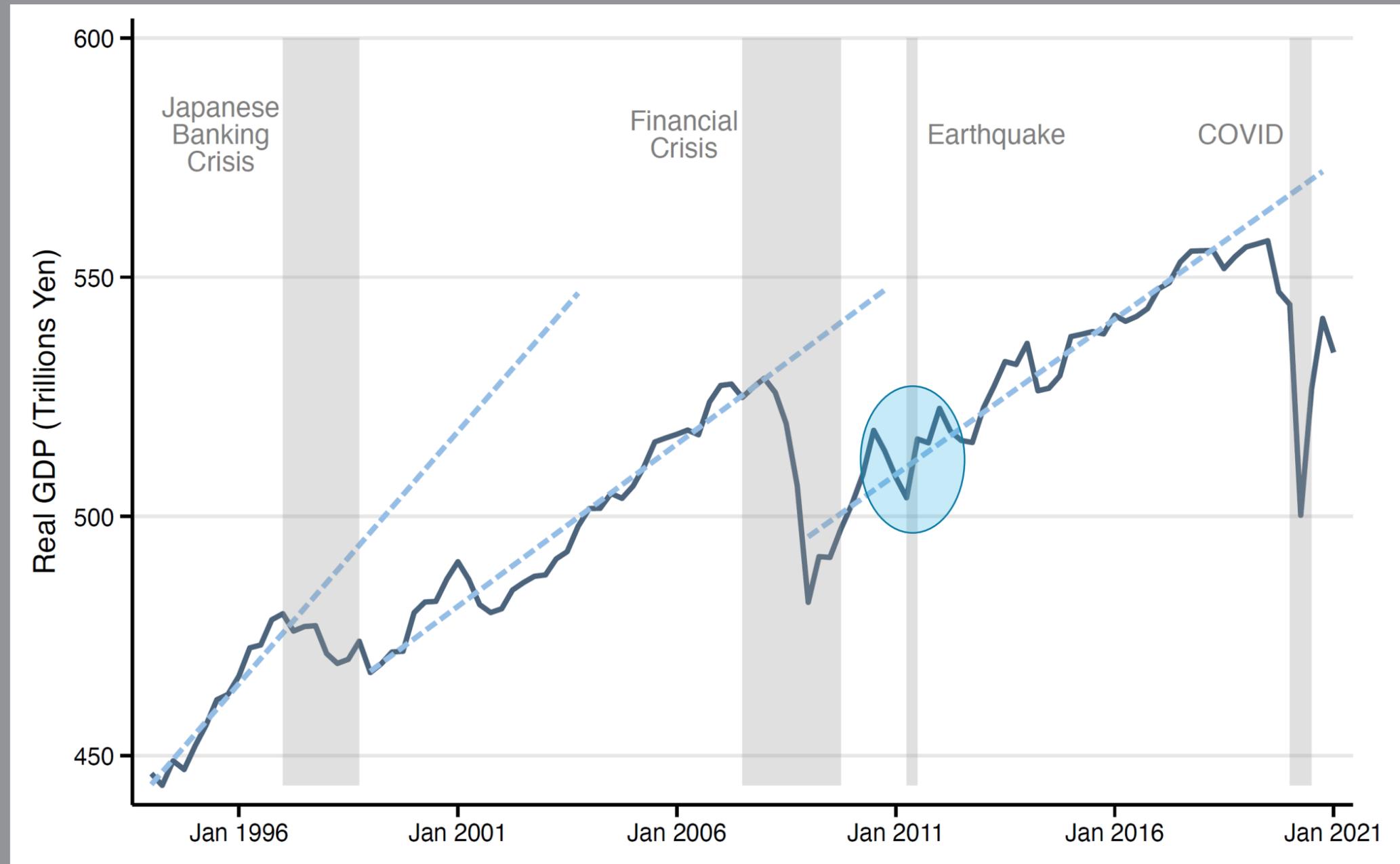
Resilience \neq Risk and Growth

- Resilient path vs. risk avoidance path



Resilience \neq Risk and Growth

- Japanese GDP
 - Lack of resilience after financial crisis, resilience after Fukushima



Resilience \neq Robustness: Some but Fewer Redundancies

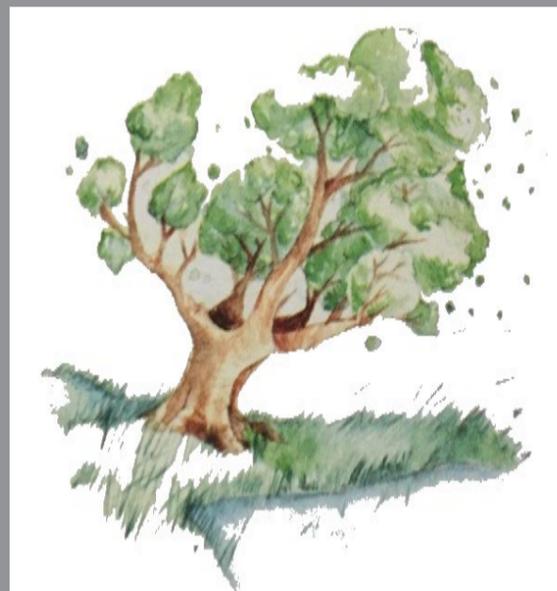


the reed

- Resilience

- Shocks affect system, but it bounces back
requires fewer redundancies
Redeployable units

- La Fontaine *“I bend, a bow, but I do not break”*



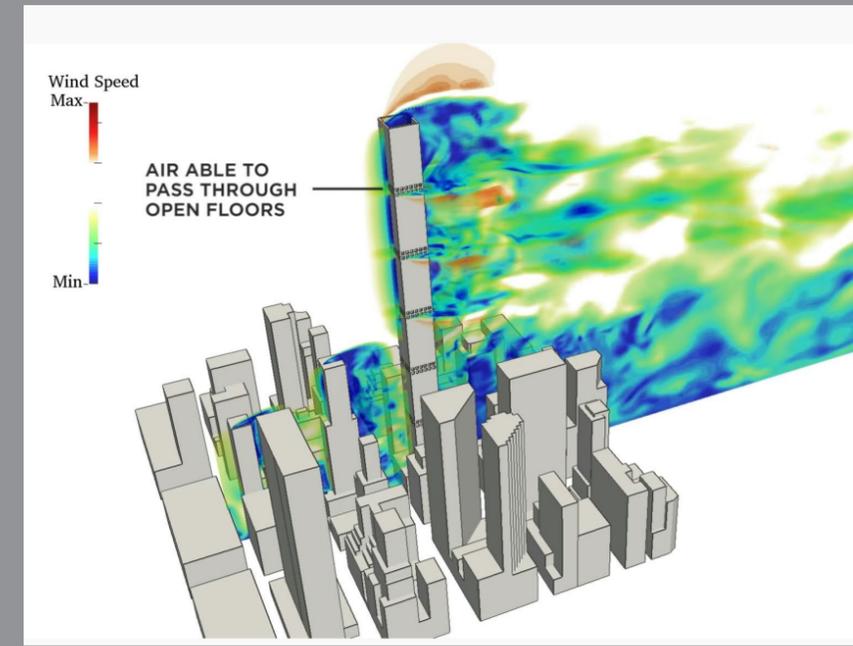
the oak

- Robustness

- If input is distorted, output remain stable/ same
- Fault-tolerance
- If probabilities are uncertain, behavior is robust
- Ability to fully absorb shocks requires many redundancies
very costly to cover extreme events
- “Robustness barrier”

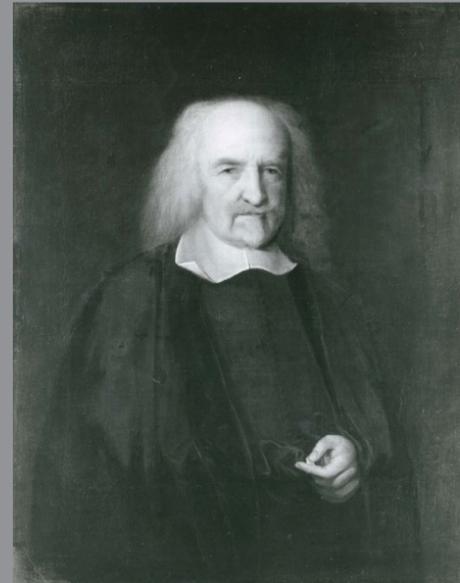
Resilience \neq Robustness: Some but Fewer Redundancies

- Material science, sky scraper, bridge
 - ... make sure it is mean reverting (vibration, oscillation)
 - ... behavior can change resilience property
 - spiral out of control (feedback loop)
- Economics
 - Robustness: Equity Capital = Redundancies
 - “Robustness barrier”
 - Resilience: Efficient Debt Restructuring
- Human immune system
 - Living in a sterile environment makes one vulnerable



Society: Social contract

- Resilient Society
 - Individual Resilience for each individual
 - Aggregate Resilience
- Thomas Hobbes, (*Leviathan*, 1651),
John Lock,
Jean-Jacques Rousseau
 - An externality interpretation
- Social contract to limit
 - Externality from others
 - Shocks (externalities from mother nature)
 - John Rawls and the “veil of ignorance”
 - Not insure, but provide resilience



Externalities $\frac{\partial u^i}{\partial x^{-i}}$ and Strategic Complementarities

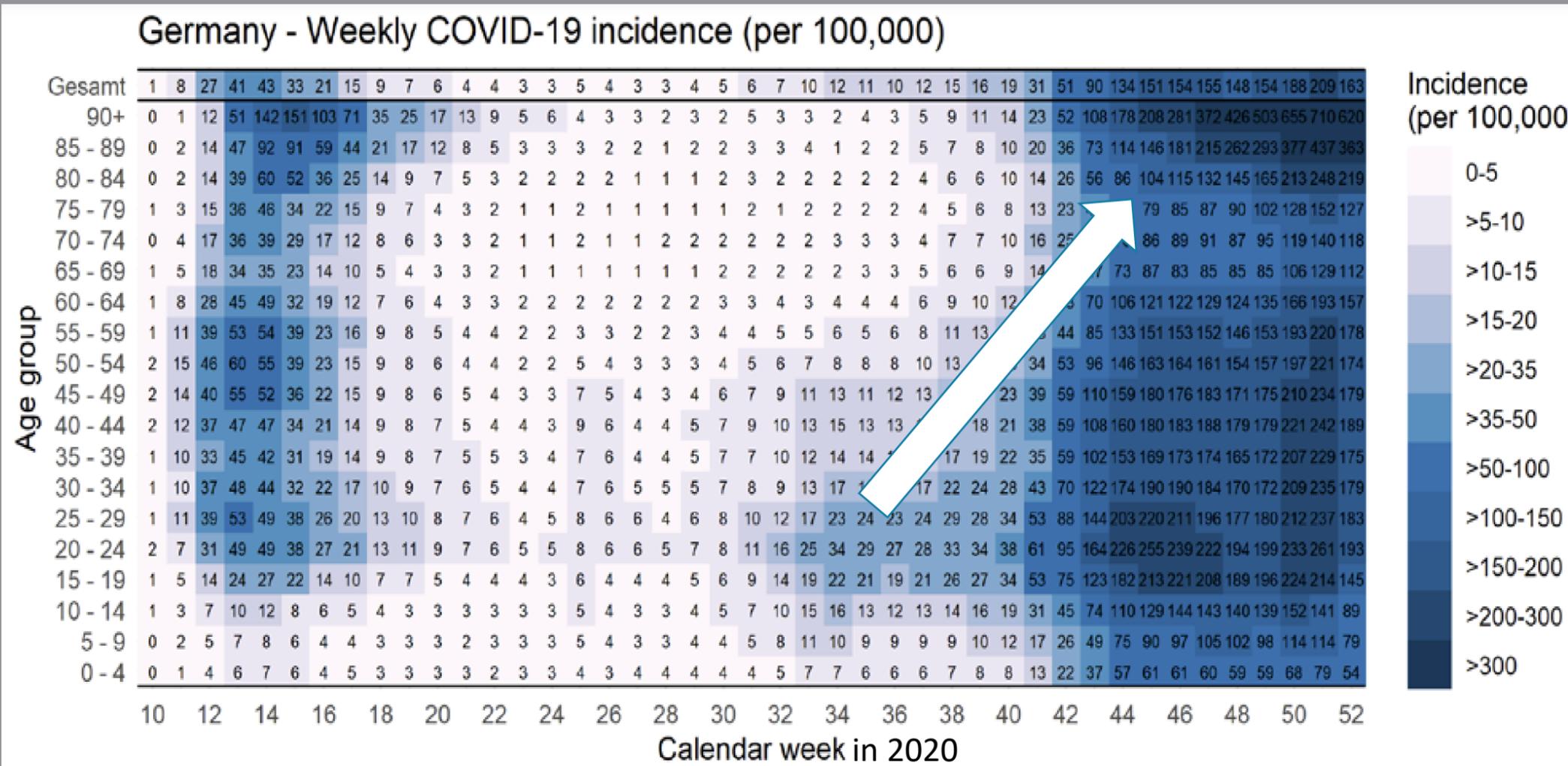
$$\frac{\partial \frac{\partial u^i}{\partial x^i}}{\partial x^{-i}}$$

How behavior impacts others'

1. Payoff/welfare

2. Behavior: Can I react to and mitigate impact

Sequential decision making



Externalities $\frac{\partial u^i}{\partial x^{-i}}$ and Strategic Complementarities

$$\frac{\partial \frac{\partial u^i}{\partial x^i}}{\partial x^{-i}}$$

How behavior impacts others'

1. Payoff/welfare

2. Behavior: Can I react to and mitigate impact

- Trap externality *[no flexibility in response]*



“behavior pushes others into trap from which she can’t bounce back”
e.g. Poverty trap (job loss and child can’t go to school)

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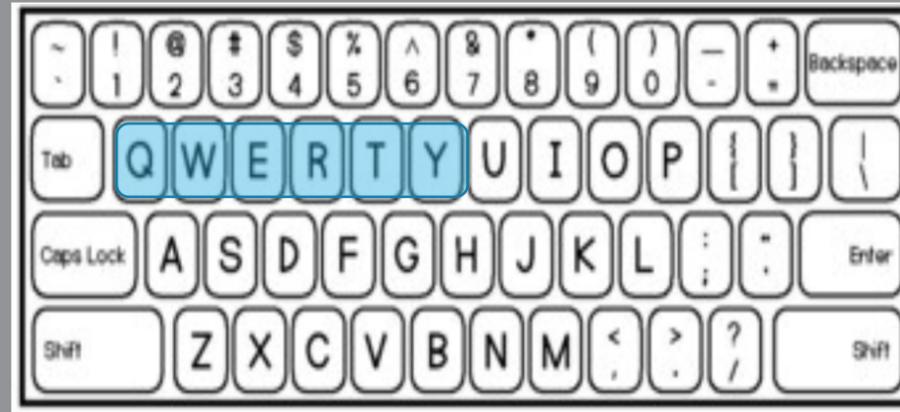
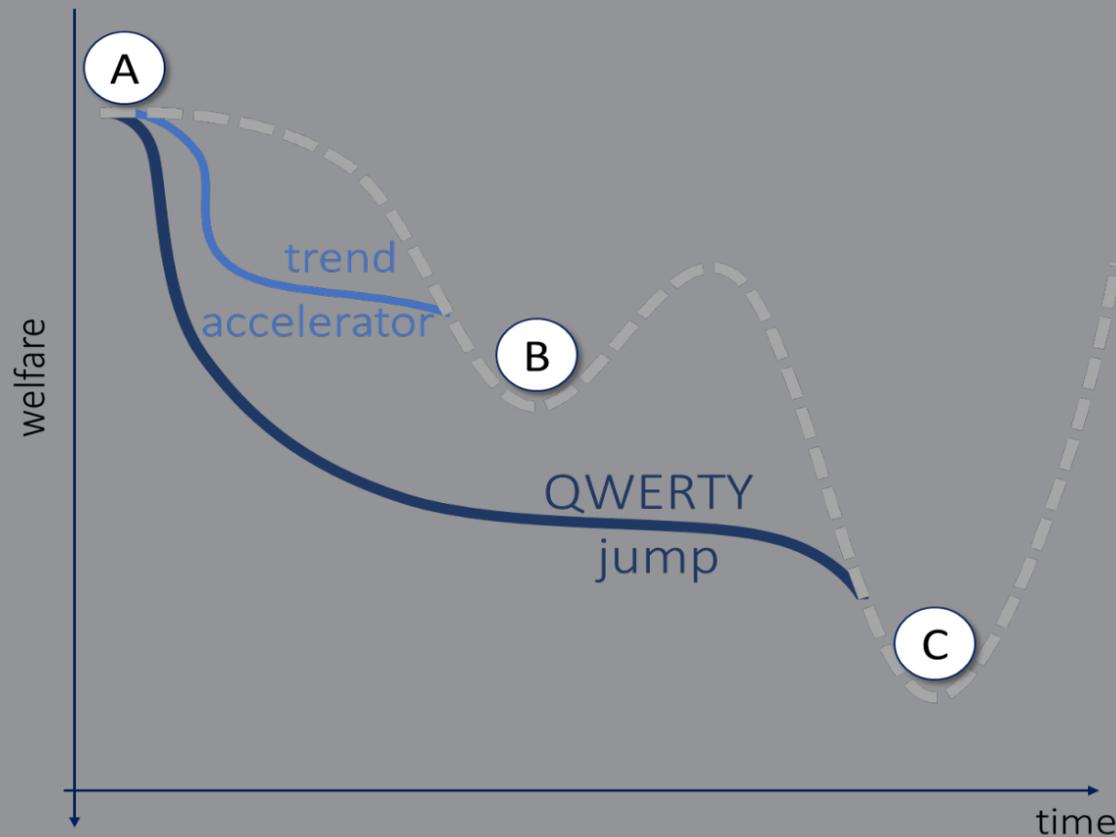
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Resilience Destroyers



Externalities $\frac{\partial u^i}{\partial x^{-i}}$ and Strategic Complementarities

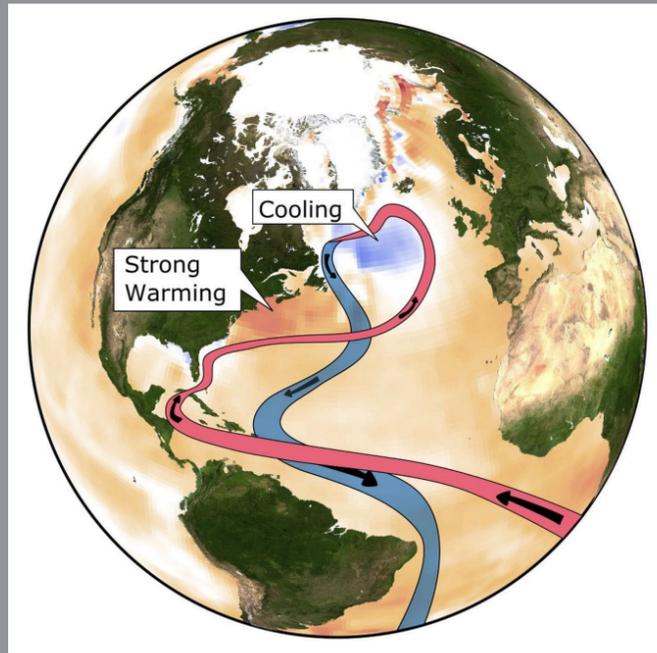
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How behavior impacts others'

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2. Behavior: Can I react to and mitigate impact?

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“behavior pushes others into trap from which she can't bounce back”
- Tipping point externality [system spirals *out of control*]
“behavior pushes others beyond tipping point/bifurcation”



Path dependency

Climate change
Turning off the Gulf stream

Externalities $\frac{\partial u^i}{\partial x^{-i}}$ and Strategic Complementarities

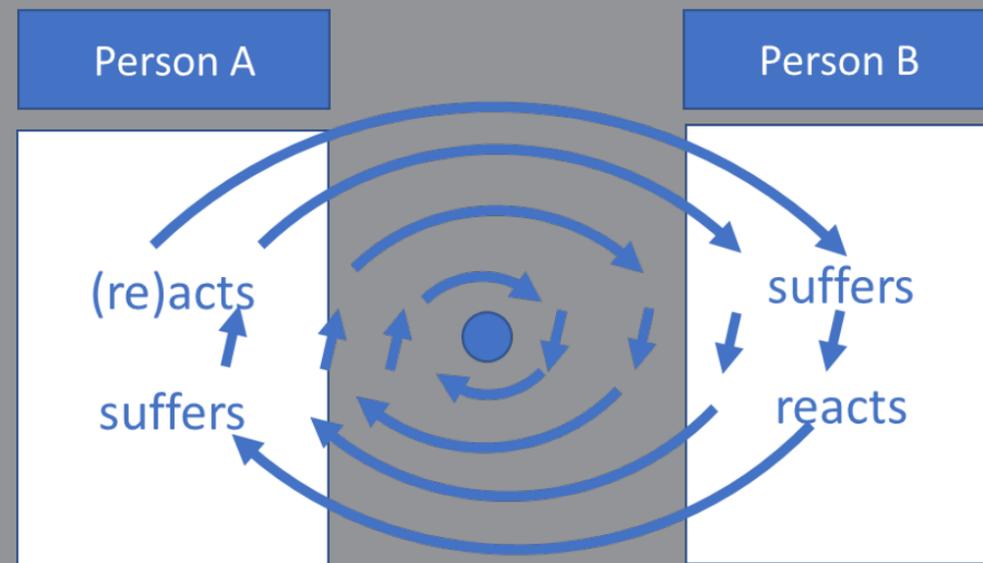
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How behavior impacts others'

1. Payoff/welfare

2. Behavior: Can I react to and mitigate impact? Sequential decision making

- Trap externality [no flexibility in response]
“behavior pushes others into trap from which she can’t bounce back”
- Tipping point externality [system spirals *out of control*]
“behavior pushes others beyond tipping point/bifurcation”
- Feedback externality
Examples: hoarding, signaling, mask wearing, ...



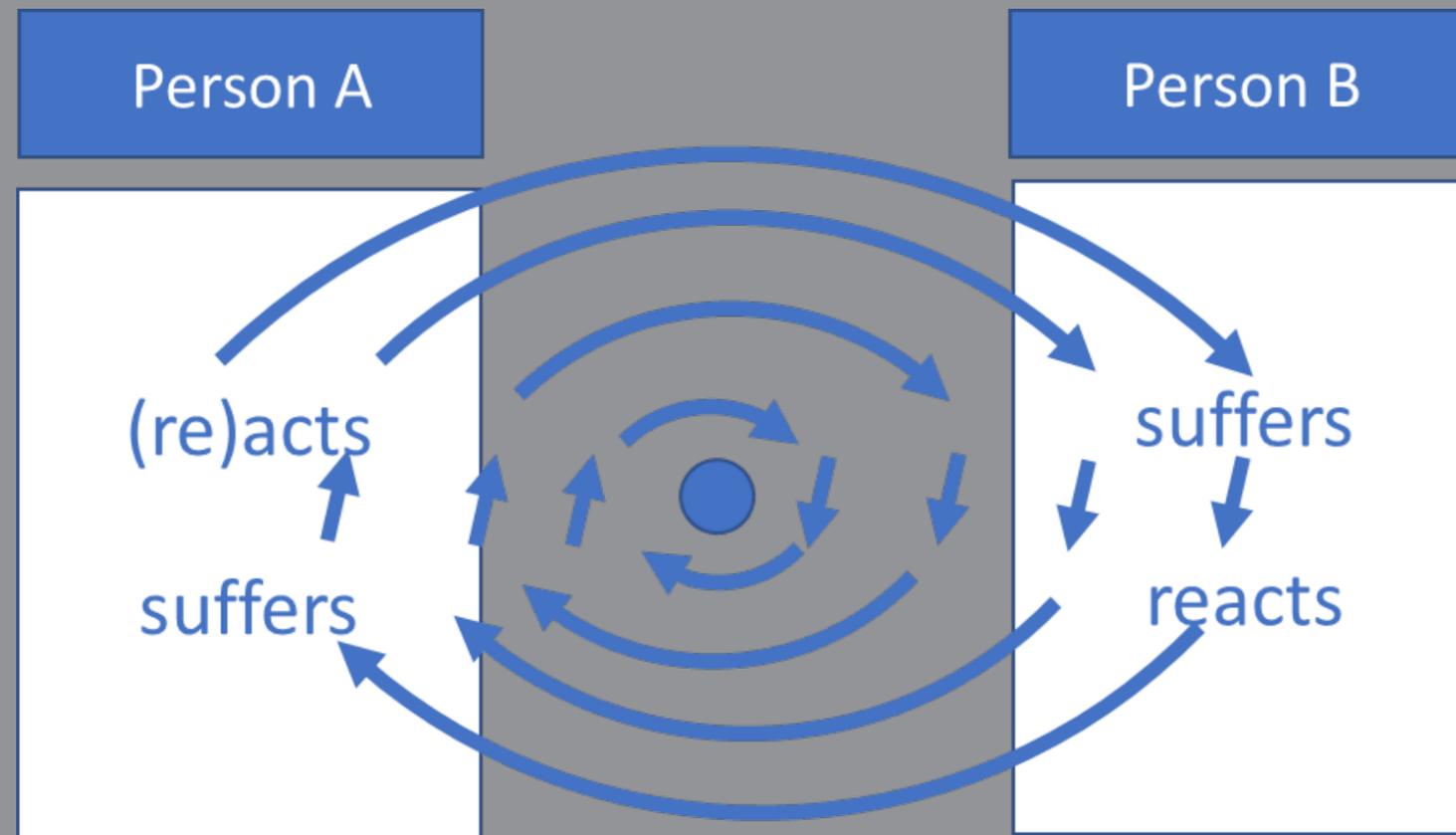
Resilience Destroyers

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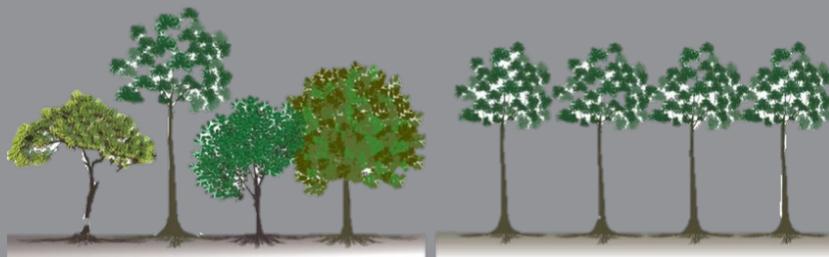
Insurance against Shocks

Social contract to limit

1. Externality from others (esp. if resilience destroying)
2. Insure idiosyncratic Shocks (externalities from mother nature)

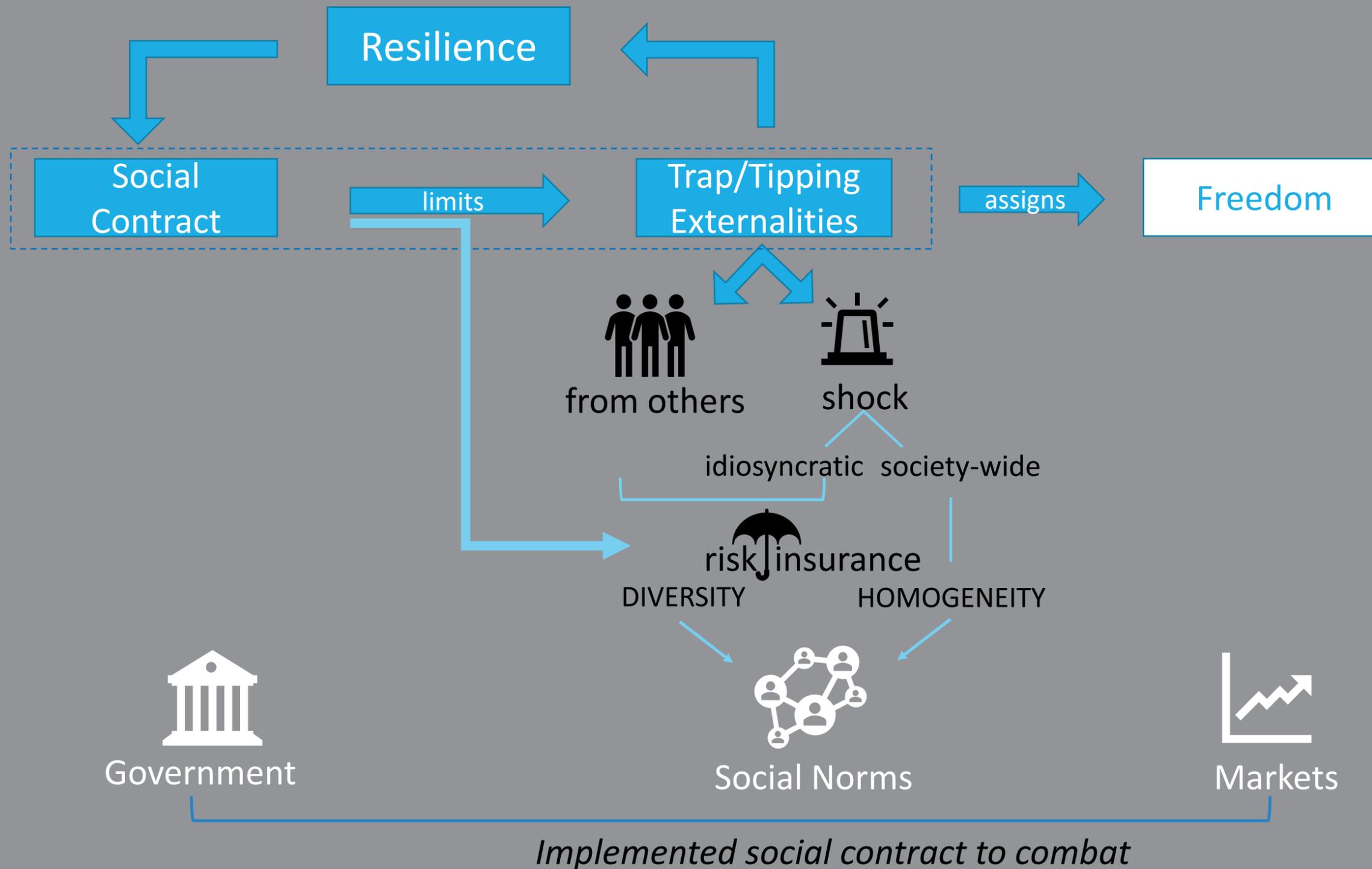
- John Rawls and the “veil of ignorance”
- Not insure, but provide resilience
 - Ladder to get out of the hole – not universal basic income
 - Dignity and limits moral hazard

- Diversity vs. Monoculture



- Pro: Shocks are more idiosyncratic than symmetric
- Con: Reduced willingness to insure each other (Alesina)

Society and Resilience: Overview

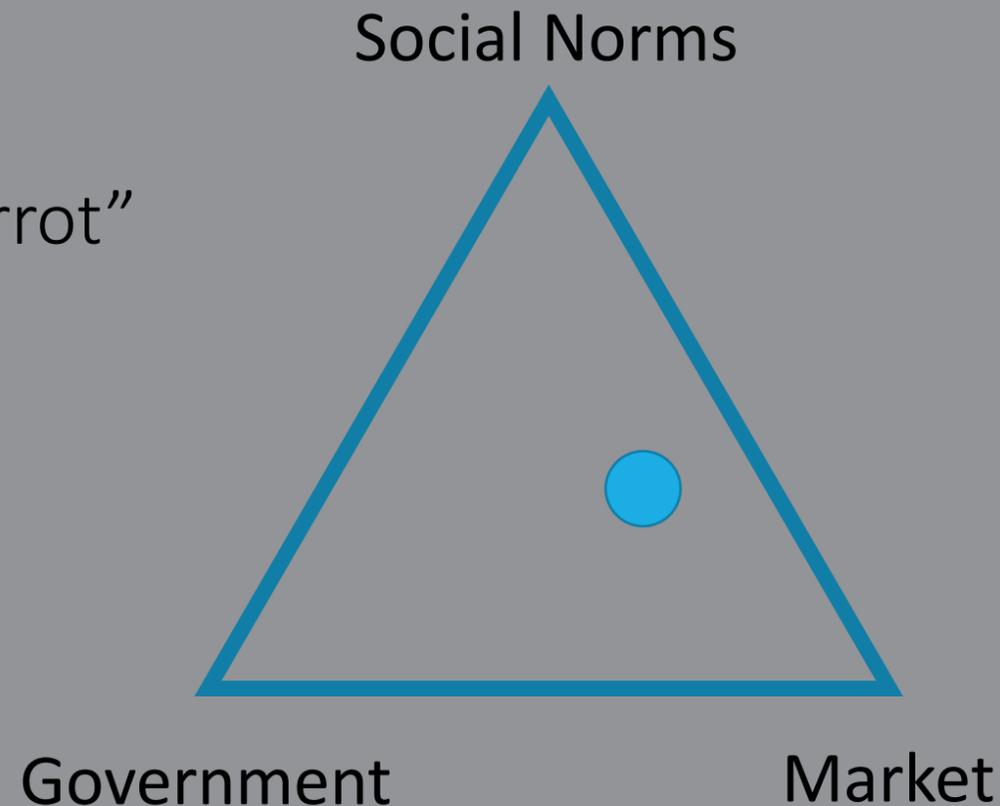


Implementing Social Contract

- Social Norms
 - Japan as example
 - Common identity, sense of community, (homogeneity)

- Government enforcements
 - Command and control
 - Pigouvian taxes/subsidy “stick/carrot”
 - Surveillance vs. privacy

- Markets (+ property rights)
 - Information aggregation
 - Explicit insurance contracts
 - Limited liability, defaultable debt
 - Growth stabilizes social contract



Rules vs. Digression

- Ex-post flexibility
- Ex-ante planning certainty

Resilience

Investment in redundancies

Book overview

- Part I: Society and Resilience
- Part II: 4 Elements of Resilience Management: COVID
- Part III: Macro Resilience
 - Innovation boost vs. Scarring/hysteresis
 - Financial whipsaw
 - Public Debt
 - Inflation whipsaw
- Part IV: Global Resilience
 - EME
 - Geopolitics, World order, Global finance, Value chains
 - Climate change

Resilience in EMDE

- Poverty Trap
 - Resilience perspective – ability to bounce back
 - Harvest failure -> children cannot go to school anymore
- Middle Income trap
 - Catching up vs. being on technological frontier
 - Investment-driven, state-based, export-based development vs.
 - Innovation-based, merit/skill allocation
- Side-effects of lockdown
 - COVID – starts as a crisis of the rich/travelers
- Limited policy space: crisis and recovery phase
 - Fiscal response: 20%, 6%, 2%
- Low interest rate environment
 - More fiscal policy space, esp. if $r < g$
 - Less monetary policy space ... hit ZLB/Reversal Rate

High Public **Debt** Levels, but **low** interest **rates**

- Debt/GDP vs. Value at Risk (Debt servicing cost | ·)

- Why is government debt interest rate so low?
Asset pricing formula with second term

$$\text{Asset Price} = E[\text{PV}(\text{cash flows})] + E[\text{PV}(\text{service flows})]$$

dividends/interest convenience yield

1. **Safe asset** service flow:

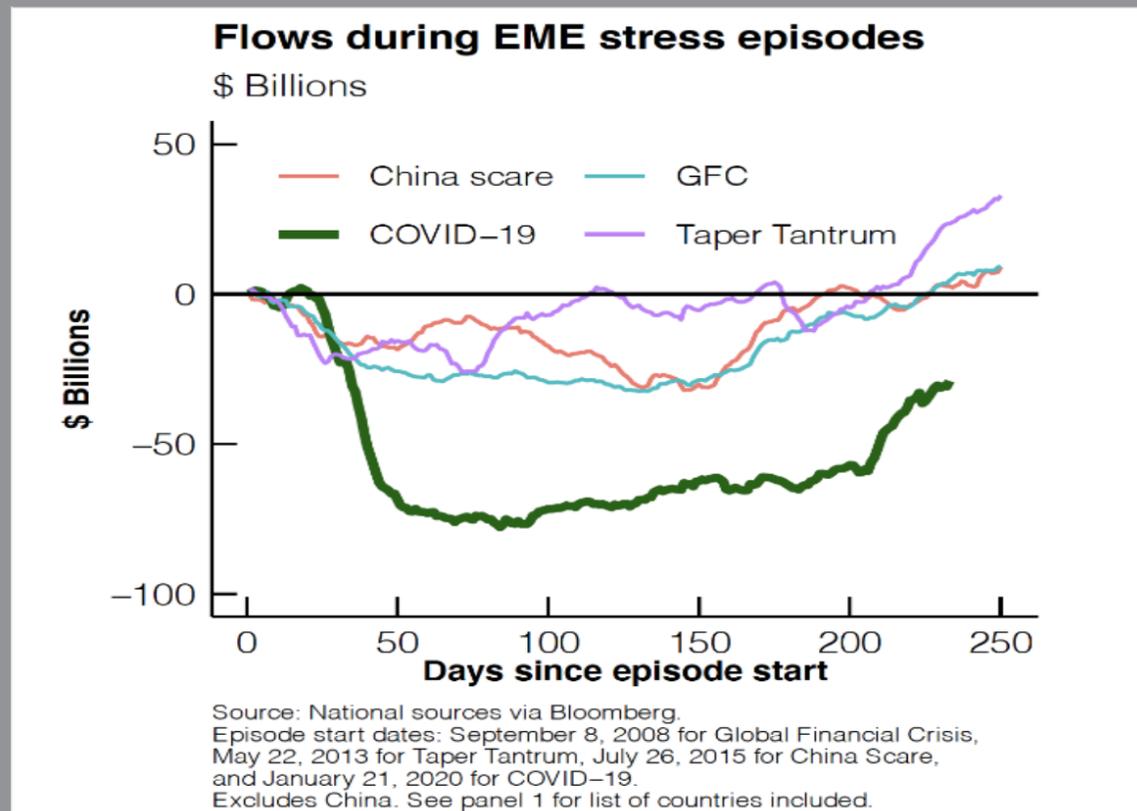
Precautionary savings + retrading (to partially insure idio risk $\tilde{\sigma}_c^2$)

2. Collateral constraint (Lagrange multiplier)

- Safe asset status of gov. bonds – bubble feature that can pop
 - Fiscal space to “defend bubble”

Global Resilience

- International Capital flows - competition with global safe assets
 - Tight US monetary policy, competition to local safe asset (gov. bond)



- Debt restructuring
 - Bounce back if designed well
 - Pro-active vs. procrastination
 - Hold-out problem, Paris Club, CAC , New Common framework

The Future of **Globalization** (Slowabilization)

- “Slowbalization” only (in trade)  but deglobalization (in services, technology transfers)
- From **cost minimization** to **Resilience**
 - **Just-in-Time** **Just-in-Case**
- **Cheap** **Reliable/sustainable**
- Cheapest supplier/country **3 different suppliers (dual sourcing) from 3 different continents**



Climate Change and Resilience

- Sustainability =
 - Resilience + no adverse long-term trend
- Proximity to tipping points – and “cheap rider problem”
- Less consumption vs. more innovation
 - Mitigation
 - Adaptation
 - Amelioration (geoengineering)
- Double externality of environmental innovation, QWERTY,
 - Climate Clubs – Border adjustment tax
- Ramp up: Green Paradox vs. future pollution
- Ex-ante and Ex-post Resilience:
Planning Security versus Flexibility

Outlook: Resilience

Resilience against

- Climate change
- Cyberattacks
- Artificial Intelligence
 - Brain Computer interfaces
- “Mental Steroids”
- Genetic and Bioengineering
- Genetically designed weapons

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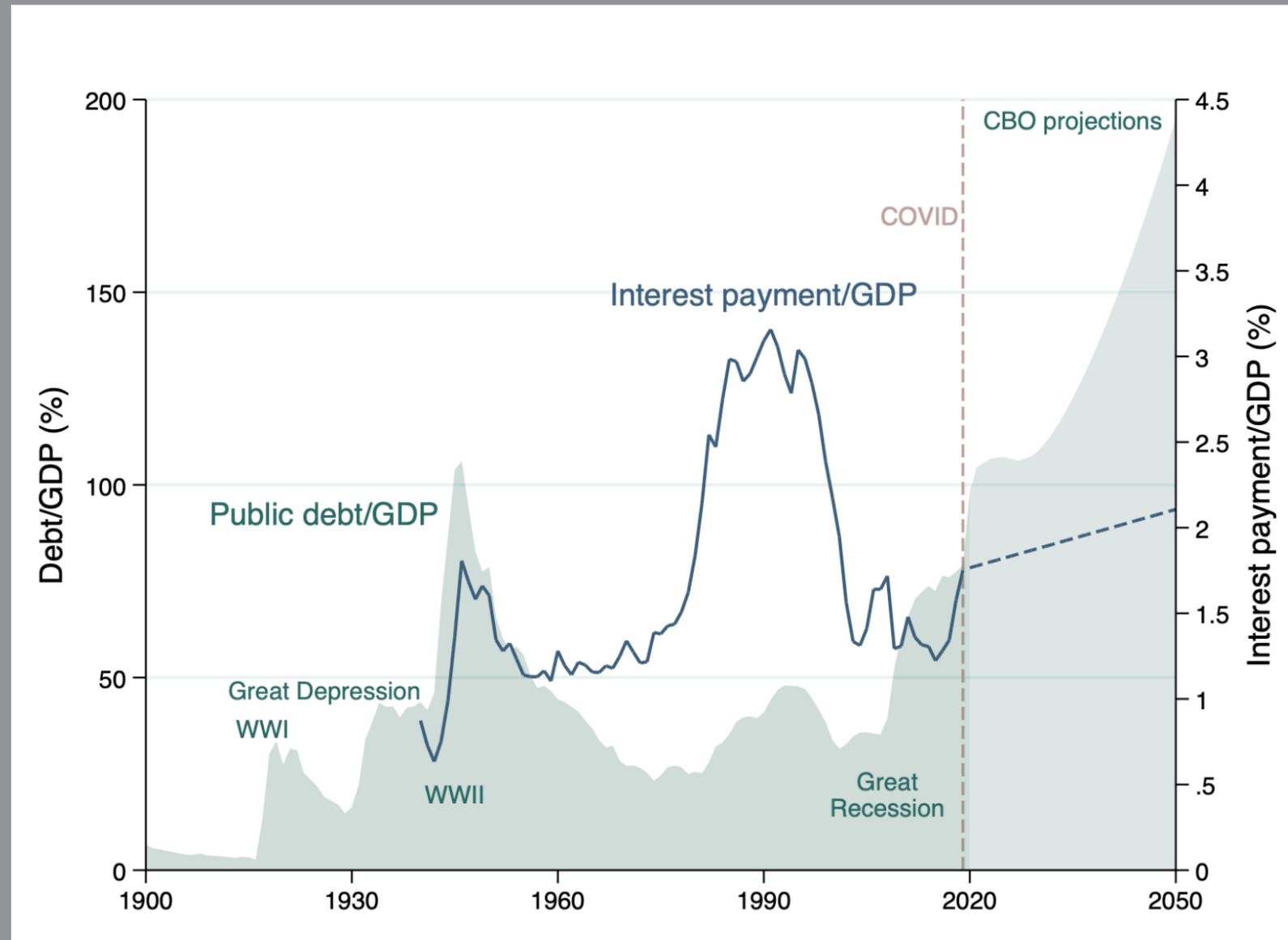
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Resilience Management

- Behavioral Response
 - Rational vs. psychological factors – waves
- Information
 - More targeted, less costly intervention
 - Covid: tiny testing costs vs. enormous lock-down costs
- Communication
 - Anxiety vs. identity management
 - Counterfactual
- Develop crisis exit: New Normal
 - Covid: Vaccine development
 - Diversification (across vaccine types)
 - Redundancies

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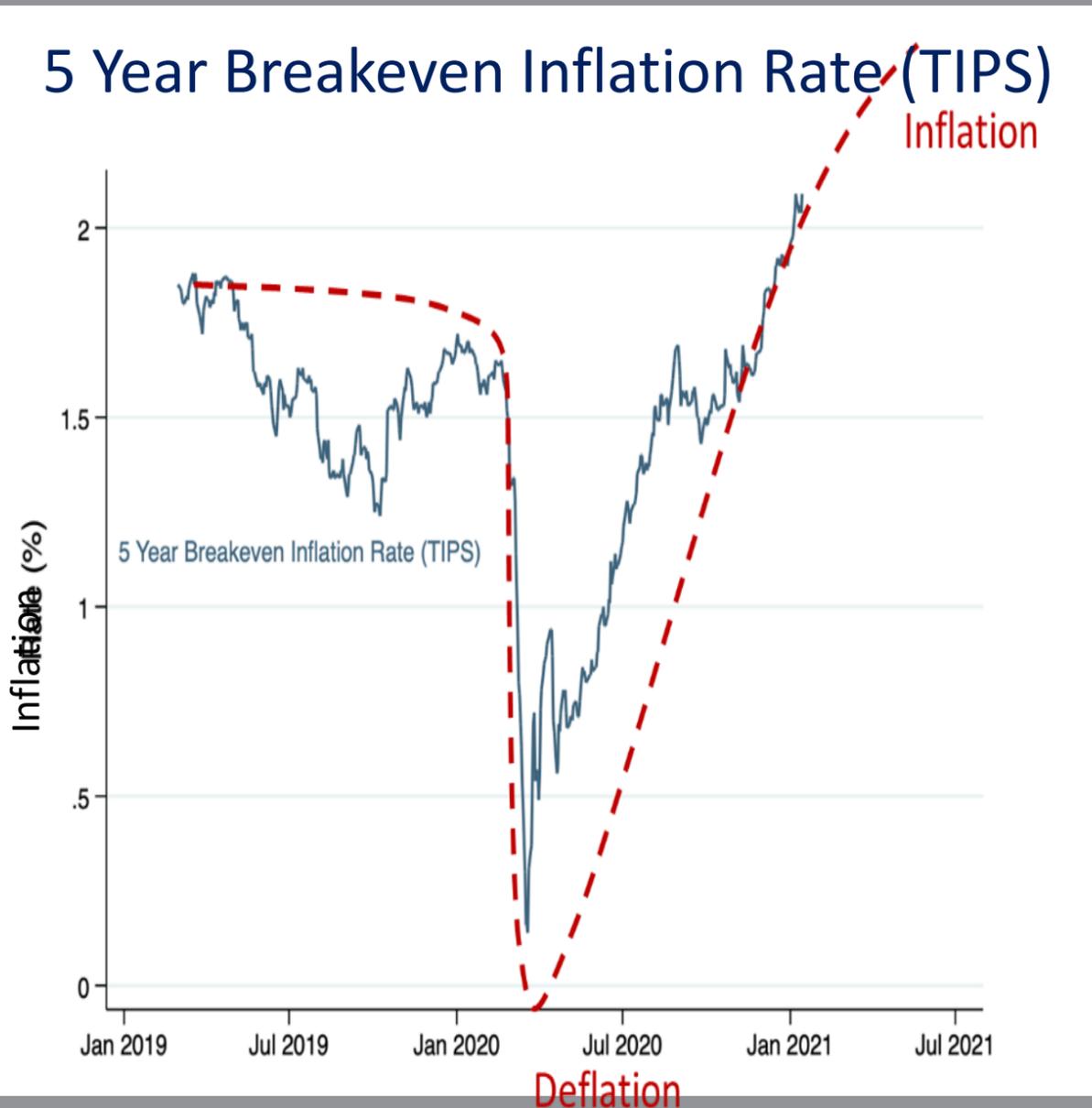
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- Why is government debt interest rate so low?

See Brunnermeier, Merkel, Sannikov (2020). “Debt as safe asset: Mining the Bubble”

Risk: “Inflation whipsaw”



- **2 traps** (“resilience killers”)

- Deflation trap

- Inflation trap (fiscal + financial dominance)

- **Independence** central bank
+ MacroPru

- Accelerator and breaks



Brunnermeier, Merkel, Parker, Sannikov (2020)